

REMARKS

Claims 3, 4 and 9 have been amended. New claim 13 has been added. The amendments find support in Applicants' specification at, for example, page 6, lines 19-21 and page 5, line 20. New claim 13 finds support at, for example, page 11, lines 11-16. No new matter has been introduced through the amendments to claims 3, 4 and 9 or through the new claim. After entry of all amendments, claims 3-13 will be pending in the subject application.

I. REJECTION UNDER 35 U.S.C. § 112, second paragraph

Claims 3-12 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Examiner states that the phrase "general formula" is unclear in clarifying if Applicants are referring to an empirical formula or to a chemical formula showing the simplest ratio of elements in a compound rather than the total number of atoms in the molecule.

Claims 3, 4 and 9 have been amended to replace each occurrence of the phrase "general formula" with "empirical formula" to clarify that the formula $\text{RSiO}_{1.5}$ indicates the simplest ratio of atoms necessary to define this component of Applicants' invention. In light of this amendment to claims 3, 4 and 9, Applicants respectfully request withdrawal of this ground for rejection.

II. REJECTION UNDER 35 U.S.C. § 102(b)

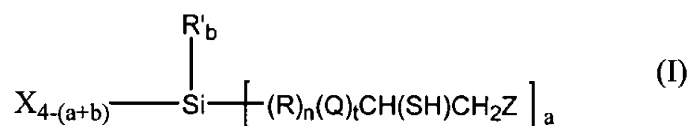
Claim 3 has been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 4,147,712 to Williams *et al.* ("*Williams*"). The Examiner contends that *Williams* discloses a laser device with all the limitations of Applicants' invention as recited in claim 3, including a teaching of a polymer substance represented by the formula $\text{RSiO}_{1.5}$ at column 2, lines 4-26 and at column 9, lines 26-68. The Examiner also cites the following as support for his rejection: the *Williams*' Abstract; column 10, lines 18-26; column 11, lines 47-56; column 12, lines 21-31; and column 13, lines 52-66.

Applicants respectfully disagree with the Examiner's assessment of *Williams* as it pertains to Applicants' invention. As indicated below, none of the sections of the *Williams*'

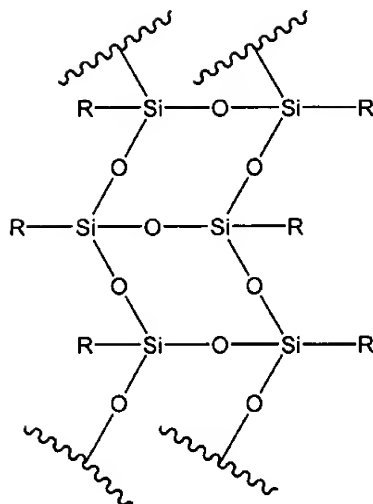
specification cited by the Examiner teaches or suggests Applicants' claimed laser device.

- Abstract: The *Williams*' Abstract states that the invention is amino substituted mercapto organosilanes and organosiloxanes useful as "coupling agents in the preparation of polymer composite materials of manufacture, such as rubber articles, thermoplastic resin articles, and thermoset resin articles. Organosilanes do not contain the Si-O-Si backbone that defines siloxanes and silsesquioxanes and therefore are not relevant. Further, organosiloxanes constitute a broad genus that encompasses several classes of Si-O-Si containing subgenera, of which the silsesquioxanes of Applicants' invention are just one. Applicants point out to the Examiner that the specific silsesquioxanes of Applicants' claim 3 are not disclosed.

- Column 2, lines 4-26: This section of the *Williams* specification describes numerous exemplary hydrocarbon radicals that R' can be in formula (I), the structure of which is depicted at column 1, line 40. Formula 1 represents a major embodiment of the *Williams*' invention and is shown below for comparison with the silsesquioxanes of Applicants' invention.



It is readily apparent that the amino substituted mercapto organosiloxanes of formula (I) are very different from Applicants' silsesquioxane component of claim 3, which may be depicted in one form as shown below.



Applicants point out that in the above structure, each silicon atom shares the three oxygen atoms to which it is bound, with three other silicon atoms. Because of this arrangement, each silicon atom can only claim $\frac{1}{2}$ of each oxygen atom. Because each silicon atom is bound to three oxygen atoms, the total number of oxygen atoms that each silicon atom can claim is $3 \times \frac{1}{2} = 1.5$. This silicon-oxygen relationship can be represented by the empirical $\text{RSiO}_{1.5}$, which is definitive of the silsesquioxanes. The R group represents the various organic functionalities that are listed in the Markush group of claim 3 (e.g. as polymethyl, polyphenyl, polycyclohexyl, etc.).

The organosilane of formula (I) does not have the required $\text{RSiO}_{1.5}$ empirical formula of Applicants' silsesquioxanes. Further, Applicants do not claim any silicon-containing compound that contains both amino and mercapto groups as taught by *Williams*.

- Column 9, lines 26-68: This section of the *Williams* specification discloses exemplary siloxy compounds of formula (IV) that form copolymers with amino substituted mercapto siloxy compounds of formula (III). *Williams* teaches that "the amino substituted mercapto organosiloxanes must contain at least one siloxy unit such as [see list of 5 siloxy unit structures] or may contain one or more siloxy units, such as $\text{R}'_3\text{SiO}_{0.5}$, $\text{R}'_2\text{SiO}$, $\text{R}'\text{SiO}_{1.5}$ or SiO_2 , wherein Z, Q, R, R', t and n are the same as defined above" (lines 26-43). Based upon this passage, the amino substituted mercapto organosiloxanes of formula (III) must contain or may contain siloxy compounds of formula (IV). Therefore, the amino substituted mercapto organosiloxanes of formula (III) are always present in any compositions taught by *Williams*. Analogous to the discussion above in the Abstract section, Applicants' silsesquioxane component of claim 3 can

be distinguished from the siloxy compounds of formula (III) because Applicants' silsesquioxanes do not contain both an amino and mercapto group in a single molecule. Because *Williams* teaches that the siloxy compounds of formula (IV) never appear alone in any of the *Williams*' compositions, a discussion of the formula (IV) compounds is not necessary.

- Column 10, lines 18-26: This section of the *Williams* specification discloses exemplary uses for the amino substituted mercapto organosilicon compounds of the *Williams*' invention. This disclosure has no bearing on Applicants' invention for at least two reasons: first, as discussed above, the *Williams*' amino substituted organosilicon compounds are very different structurally from Applicants' silsesquioxanes; and second, this disclosure does not even mention use of silicon containing compounds in lasers. In fact, there is no teaching of using the *Williams*' organosilicon compounds as a laser component anywhere in the *Williams* specification.

- Column 11, lines 47-56: This section of the *Williams* specification discloses preferred embodiments for binding an inorganic substrate (e.g. glass fibers) to the *Williams* amino substituted mercapto organosilicon compounds. As discussed earlier, the amino substituted mercapto organosilicon compounds taught by *Williams* are structurally very different from the silsesquioxanes of Applicants' claim 3. Further, there is no teaching in this section that that the glass fiber-organosilicon composite may be used in a laser device.

- Column 12, lines 21-31: This section of the *Williams* specification discloses that the amino substituted mercapto organosilicon coupling agents of the invention "lend themselves to any conventional process where organic polymers are to bonded to inorganic substrates..." This extremely broad disclosure clearly does not teach or suggest Applicants' laser device of claim 3 containing the recited silsesquioxanes.

- Column 13, lines 52-66: This section of the *Williams* specification describes the experimental procedure for preparing 1,2-epithio-4-oxa-7-trimethoxysilyl heptane, which is an intermediate in the preparation of one of *Williams*' amino substituted mercapto organosilicon compounds. The structure of this intermediate was confirmed by, among other things, laser Raman spectroscopy. The use of the word "laser" in this situation refers to a common spectroscopic technique for analyzing the structure of a chemical compound and does not teach

or suggest that the laser contains the optical fiber or laser light source required by Applicants' claimed laser device.

As a careful analysis of each of the above sections of the *Williams* patent cited by the Examiner indicates, *Williams* does not teach or suggest Applicants' recited laser device comprising a laser light source and optical fiber, wherein at least part of the optical fiber is fixed in a dense state by an optical medium containing silsesquioxanes. The amino substituted mercapto organosilicon compounds described by *Williams* are structurally very different from Applicants' silsesquioxanes and further, *Williams* does not teach or suggest the use of its organosilicon compounds in any type of laser device. Because *Williams* does not teach or suggest each and every element of Applicants' claim 3, *Williams* cannot anticipate claim 3. Applicants therefore request that this ground for rejection be withdrawn.

III. REJECTION UNDER 35 U.S.C. § 103(a)

Claims 4 and 6-8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Williams* in view of U.S. Patent 6,144,795 to Dawes *et al.* ("*Dawes*").

Regarding claim 4, the Examiner states that *Williams* discloses Applicants' invention except for the optical medium containing amorphous silica produced by curing at least one member selected from a group consisting of a poly(2-chloro ethyl) silsesquioxane, a poly(2-bromo ethyl) silsesquioxane and a mixture thereof. According to the Examiner, *Dawes* teaches this limitation of Applicants' claim 4 and it would have been obvious to combine this teaching with the laser device of *Williams*.

As discussed above, *Williams* does not teach or suggest Applicants' claimed laser device. *Dawes*, as the secondary reference cannot remedy the above-recited deficiencies present in *Williams*.

Regarding claims 6-8, the Examiner states that *Williams* discloses Applicants' claimed laser device except for the limitations present in claims 6-8, *i.e.* an optical fiber fixed in a bundled state, an optical fiber fixed with the flat surface closely contacted with one another, and a light signal amplifying device, respectively. According to the Examiner, *Dawes* teaches these limitations and it would have been obvious to combine these teachings with the laser device of *Williams*.

Williams does not teach or suggest Applicants' laser device with its particular requirements of an optical fiber, a laser light source and a silsesquioxane-containing optical medium, and *Dawes* as the secondary reference in the § 103(a) rejection cannot remedy these deficiencies. Applicants therefore request that the ground for this rejection be withdrawn.

The Examiner has rejected claim 5 under 35 U.S.C. § 103(a) as being unpatentable over *Williams* in view of U.S. Patent 6,144,795 to Dawes *et al.* ("*Dawes*") and further in view of U.S. Patent 6,052,392 to Ueda *et al.* ("*Ueda*"). According to the Examiner, *Williams* in view of *Dawes* discloses Applicants' invention except for the optical fiber being wound in a spiral or coil-like shape. The Examiner states that *Ueda* teaches an optical fiber wound in a spiral or coil-like shape and it would have been obvious to combine these teachings with the laser device of *Williams* in view of *Dawes*.

Williams does not teach or suggest Applicants' claimed laser device, and *Dawes* and *Ueda* as secondary references cannot remedy the deficiencies. Applicants therefore request that the ground for this rejection be withdrawn.

**IV. CONCLUSION**

In view of the foregoing, Applicants respectfully request withdrawal of all rejections and objections and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

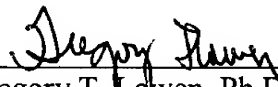
If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully Submitted,

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